IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

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Thank you for your cooperation and understanding,

WeEn Semiconductors

BYV410-600

Dual enhanced ultrafast power diode

Rev. 2 — 5 August 2011 Product data sheet

1. Product profile

1.1 General description

Dual enhanced ultrafast power diode in a SOT78 (TO-220AB) plastic package.

1.2 Features and benefits

- High thermal cycling performance
- Low on state losses
- Low thermal resistance
- Soft recovery characteristic minimizes power consuming oscillations

1.3 Applications

- Dual mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

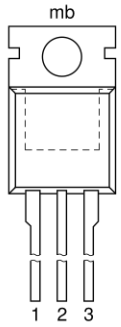
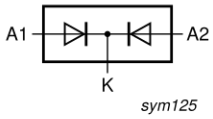
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{O(AV)}$	average output current	square-wave pulse; δ = 0.5 ; T_{mb} ≤ 92 °C; both diodes conducting; see Figure 1; see Figure 2	-	-	20	A
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 150 °C	-	1.3	1.9	V
		I_F = 10 A; T_j = 25 °C; see Figure 4	-	1.4	2.1	V
Dynamic characteristics						
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/μs; T_j = 25 °C; see Figure 5	-	20	35	ns
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/μs	-	15	28	nC

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; cathode		

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

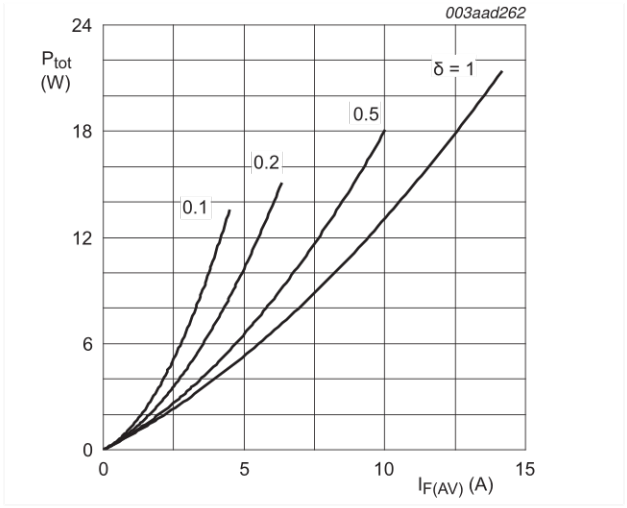
Type number	Package		
	Name	Description	Version
BYV410-600	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. Limiting values

Table 4. Limiting values

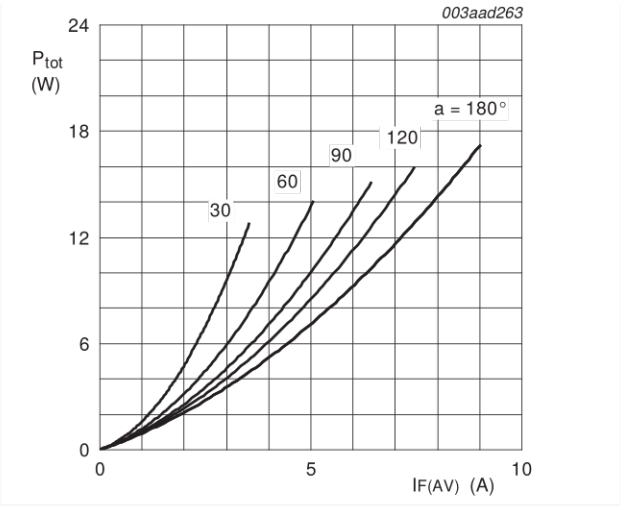
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{O(AV)}$	average output current	square-wave pulse; δ = 0.5 ; T_{mb} ≤ 92 °C; both diodes conducting; see Figure 1; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 108 °C; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	t_p = 8.3 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C; per diode	-	132	A
		t_p = 10 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C; per diode	-	120	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	with heatsink compound; per diode; see Figure 3	-	-	2.4	K/W
		with heatsink compound; both diodes conducting	-	-	1.6	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient		-	60	-	K/W

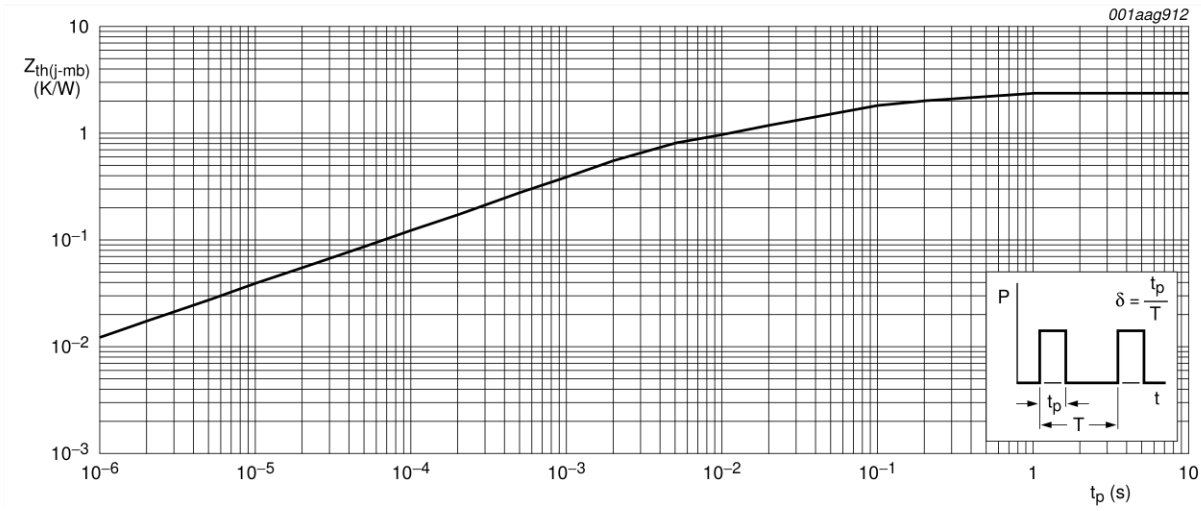
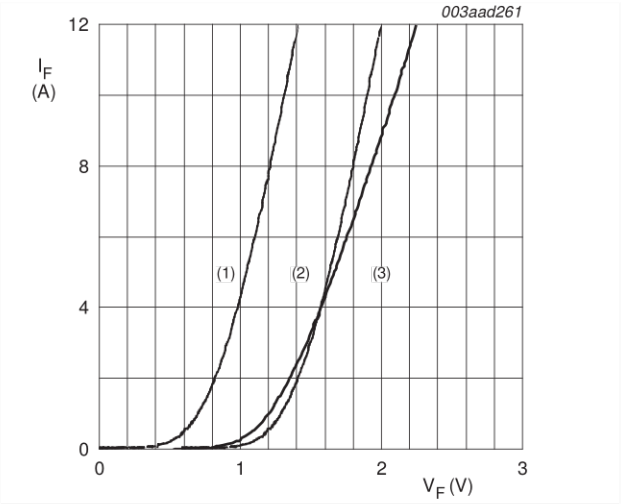


Fig 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 150 °C	-	1.3	1.9	V
		I_F = 10 A; T_j = 25 °C; see Figure 4	-	1.4	2.1	V
I_R	reverse current	V_R = 600 V	-	13	50	μA
		V_R = 600 V; T_j = 100 °C	-	1	1.5	mA
Dynamic characteristics						
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/μs	-	15	28	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/μs; T_j = 25 °C; see Figure 5	-	20	35	ns
I_{RM}	peak reverse recovery current	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/μs; see Figure 5	-	1.4	1.9	A
V_{FR}	forward recovery voltage	I_F = 1 A; dI_F/dt = 100 A/μs; see Figure 6	-	3.2	-	V



(1) $T_j = 150\ °C$; typical values
(2) $T_j = 150\ °C$; maximum values
(3) $T_j = 25\ °C$; maximum values

Fig 4. Forward current as a function of forward voltage

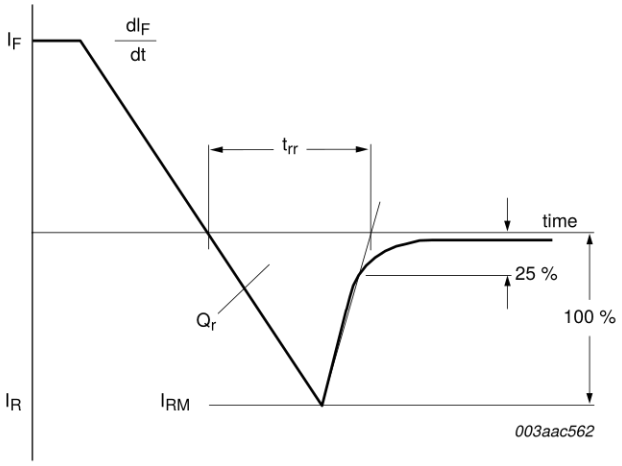


Fig 5. Reverse recovery definitions; ramp recovery

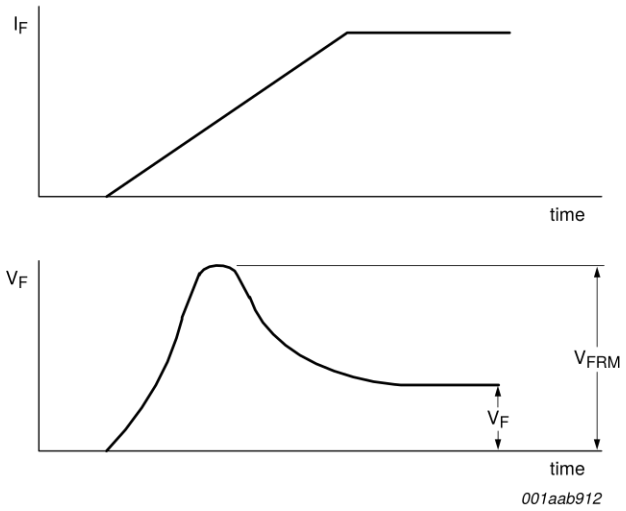
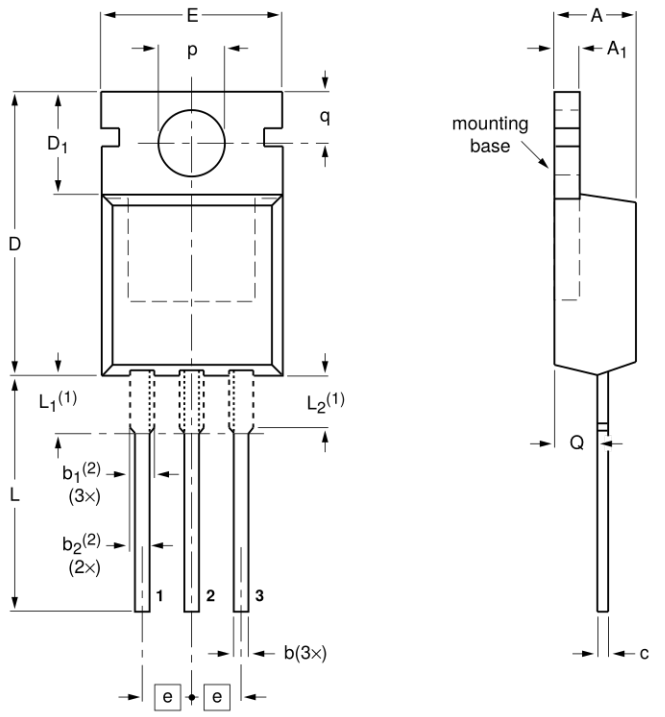


Fig 6. Forward recovery definitions

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

Fig 7. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV410-600 v.2	20110805	Product data sheet	-	BYV410-600_1
Modifications:	• Various changes to content.			
BYV410-600_1	20090629	Product data sheet	-	-

9. Legal information

9.1 Data sheet status

Document status [1] [2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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11. Contents

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